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Original Article

Introduction of Kazakh national sports games into the system of physical education for preschool children

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ABSTRACT

The present study aims to assess the influence of a structured physical education program based on elements of Kazakh national sports games on the psychomotor development of preschool children. Research methodology includes a pedagogical quasi-experiment conducted on 400 children divided into one control and two experimental groups with different ratios of structured to unstructured activities. Diagnostic tools included standardized tests for motor and cognitive development (M-ABC-2, "GNOM"), anthropometric measurements, questionnaires, and qualitative analysis. The results show no statistically significant differences in physical and cognitive development between the groups. However, the experimental group with a combined approach (50:50) demonstrated a steady trend towards more pronounced positive changes. The parent survey revealed significant differences ($p<0.01$) in attitudes toward national games with a significant increase in at-home play (by 32%). The findings testify to the effectiveness of the combined approach to the integration of Kazakh national sports games into the preschool physical education system and provide a methodological basis for implementing this approach in the educational process. The results have theoretical and practical significance for the improvement of methodological approaches to preschool physical education considering the cultural and historical background of the Kazakh people and modern trends in preschool pedagogy.

Keywords: Combined approach, Preschool physical education, Psychomotor development, Structured and unstructured activities

Introduction

Physical development in preschool age is a fundamental component in the child's general development that has a significant impact on the development of cognitive, social and emotional skills. The World Health Organization (WHO) (2019) recommends that preschool children should have at least 180 minutes of physical activity per day [1]. The age from 3 to 5 years is distinguished by the intensive development of motor skills. It is a sensitive age for the development of motor functions, which is confirmed by research in the field of preschool pedagogy and developmental psychology [2-4].

Current research provides evidence of the relationship between physical activity and cognitive processes in preschool children. The effectiveness of a preschool physical education program in building fundamental motor skills using different learning styles has been experimentally proven [5-8]. Martinez-Merino and Rico-González (2024) emphasize the impact of physical education on preschool children's motor, cognitive, and social competencies [9].

Research on early childhood sports for optimal holistic development emphasizes the need for an integrated approach to

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the physical education of preschoolers [10-12]. Comprehensive development of children's physical education is realized through play activities [13]. Modern pedagogical practice uses two main types of games: international sports games centered around Olympic sports and national (national-cultural) sports games popular in a particular region (country). In this study, we focus on national sports games and the incorporation of their elements into the general program of physical development of preschool children. This choice stems from the need to preserve cultural heritage through preschool physical education.

The integration of the cultural component in the physical education of preschool children is particularly relevant to the preservation of national identity [14-16]. UNESCO in the International Charter of Physical Education and Sport emphasizes the need to include cultural elements in children's physical development programs to promote the development of a well-rounded personality with due regard to the sociocultural context [17-19].

Kazakh national sports, having a variety of motor actions and deep cultural and historical roots, are of great interest for the system of preschool physical education. Kalshabayeva and Imanberlinova (2018) stress the role and importance of national games in the education of youth and the preservation of Kazakh cultural identity [20].

Kazakh national sports games are elements of national physical culture that have a less formalized structure compared to sports but also a competitive component and cultural and historical significance. These include, for example, assyk atu (assyk game — ram bones), tenge alu (picking up coins from the ground on horseback), arkan tartys (tug-of-war), etc. Exploring the strategy of integrating folk sports games in preschool physical education, Qi (2023) proposes structured approaches to the adaptation of traditional games to children's age characteristics [21].

To better explain our research methodology, it is important to distinguish between structured and unstructured forms of physical activity based on Kazakh national sports games. Structured sports games are understood as organized activities with a clearly regulated sequence of actions, fixed rules, systematic pedagogical control, and a focus on the development of specific motor skills. Unstructured sports games are marked by the predominance of children's self-organization, variability of execution, minimal intervention of the teacher, and the priority of play over mastering specific technical elements.

Kazakh national sports games are an effective tool for physical education, combining the cultivation of physical qualities with introduction to cultural heritage. Research findings indicate that national sports games support several key dimensions of preschool children's development. In children aged 3–4 years, they are associated primarily with improvements in the psycho-emotional state [4]. In children aged 5–7 years, traditional games contribute to the development of social interaction and gross motor skills [22]. More broadly, studies on preschoolers show that national sports games promote motor development and help preserve national culture [23], enhance communication skills and cognitive functions [24], and support the development of psychomotor abilities [25].

Despite the presence of individual studies devoted to the integration of traditional games into the educational process [26-28], there is a methodological gap in the study of specific mechanisms behind the effects of Kazakh national sports games. This gap owes to the fact that most studies focus on school-age children (7 years old and above), while the methods of adapting national games for the age group of 3–6 years are unstructured. This situation can be explained by the difficulty of adapting traditional rules and equipment to the psycho-physiological characteristics of this age group.

The goal of the study was to determine the effectiveness of a structured physical education program based on elements of Kazakh national sports games in terms of the psychomotor development of preschool children (3–6 years old).

Research question

How do different methodological approaches to the integration of Kazakh national sports games affect the physical, cognitive, and socio-emotional development of preschoolers at the age of 3–6 years?

Additional questions

1. What elements of national sports are the most appropriate for children in different age groups (3–4 and 5–6 years)?
2. What competencies do teachers need to effectively teach adapted national games in the system of preschool education
3. How does the use of adapted national sports games affect the physical, cognitive, and socio-emotional development of preschoolers compared to physical education classes under the standard program used in state preschool educational institutions in Kazakhstan?

Materials and Methods

Study design

To achieve the research goal and answer the research questions, the study used a set of quantitative and qualitative methods of data collection and analysis. The primary research method was a pedagogical quasi-experiment with control and experimental groups, which allowed us to identify cause-and-effect relationships between the integration of Kazakh national sports in the physical education program and the dynamics of children's development.

The preschool physical education program incorporated four adapted Kazakh national sports games: assyk atu to develop fine motor skills, movement accuracy, and spatial thinking; togyz kumalak to support cognitive functions, strategic thinking, and counting skills; arkan tartys to promote strength, coordination, and teamwork; and tenge alu to improve coordination, dexterity, and reaction time. All games were modified according to the age characteristics of children aged 3–6 years through simplified rules, safer equipment, and adjusted task conditions.

These sports games were chosen due to their correspondence to the psychophysiological features of preschool children, the feasibility of their modification according to children's age, and their cultural and historical value for the development of national identity.

Research hypotheses

Primary hypothesis

The integration of elements of Kazakh national sports games into the system of physical education for preschoolers results in a statistically significant increase in the indicators of physical, cognitive, and socio-emotional development of children aged 3–6 years in comparison to an exclusively standard physical education program regulated by the normative documents from the Ministry of Education and Science of the Republic of Kazakhstan.

Participants

The study included a total of 400 preschool children (M = 4.52 years old, SD = 0.73) from 20 preschool institutions located in different regions of Kazakhstan (10 urban, 10 rural). The institutions were selected by stratified random sampling considering their location and type of settlement. When distributing participants into groups, the principle of gender balance was observed (51.3% boys, 48.7% girls). The age-stratified distribution of participants across the control and experimental groups, together with the corresponding physical education formats, is presented in **Table 1**.

Table 1. Optimized study design with age stratification

Group	Age category	Number of participants	Physical education method	Frequency
Control group (younger)	Younger preschool age (3–4 years)	n = 50	Standard program according to the Order of the MES RK No. 499	3 times a week, 30–35 minutes each
Control group (older)	Older preschool age (5–6 years)	n = 50	Standard program according to the Order of the MES RK No. 499	3 times a week, 30–35 minutes each
Experimental group 1 (younger)	Younger preschool age (3–4 years)	n = 50	Structured Kazakh national sports games	3 times a week, 30–35 minutes each
Experimental group 1 (older)	Older preschool age (5–6 years)	n = 50	Structured Kazakh national sports games	3 times a week, 30–35 minutes each
Experimental group 2 (younger)	Younger preschool age (3–4 years)	n = 50	Combination of structured (50%) and unstructured (50%) activities	2 structured sessions + daily unstructured play activities
Experimental group 2 (older)	Older preschool age (5–6 years)	n = 50	Combination of structured (50%) and unstructured (50%) activities	2 structured sessions + daily unstructured play activities

In addition, the study examined the opinions and experiences of adult participants involved in preschool education and the cultural adaptation of national sports games. These participants included 60 teachers and physical education instructors, 20 experts in national sports with at least five years of professional experience, and 100 parents, with five representatives recruited from each kindergarten.

Informed consent was obtained from the parents or legal representatives of each child. The study was approved by the University's Ethical Committee.

Research stages and procedure

The formative stage of the study took place over the course of 10 months and was organized in four consecutive stages **(Table 2)**. Each stage had pedagogical objectives and time frame, which ensured the systematic introduction of Kazakh national sports games into the program of physical education for preschool children.

Table 2. Structure of the formative stage of the study

Stage	Period	Key objectives
Preparatory	Weeks 1–4	- Introducing children to the basic elements of Kazakh national sports - Building initial interest in national physical activities - Identifying children's individual preferences and aptitudes - Adapting equipment and methodological approaches to the specifics of the age groups
Basic	Weeks 5–16	- Systematically introducing elements of Kazakh national sports with differentiated programs for each subgroup - Gradually increasing the difficulty of motor tasks - Developing basic technical skills in accordance with the characteristics of the subgroup - Monitoring children's physical adaptation and the development of their interest

Primary	Weeks 17–32	- Fully implementing the program with different ratios of structured to unstructured activities for each subgroup - Including competitive elements in structured activities - Deepening the mastery of techniques in performing the elements of Kazakh national sports games - Interim assessment of the dynamics of children's development indicators
Concluding	Weeks 33–40	- Solidifying the mastered skills - Increasing children's autonomy in organizing play activities based on Kazakh national sports games - Integrating the mastered elements into complex game forms - Preparation for final diagnostics

- Anthropometric indicators were measured at baseline and after 6 and 12 months and included height, weight, body mass index, chest circumference, and dynamometry for children aged 5–6 years.
- Motor development was assessed using the Movement Assessment Battery for Children-2 (M-ABC-2) [29].
- Cognitive and socio-emotional development was evaluated using the Children's Neuropsychological Test "GNOM" [30].
- Semi-structured interviews were conducted with experts, teachers, and parents (n = 20 in each group).
- Focus groups were held with teachers (three sessions) and preschool administrators to examine methodological aspects of integrating national sports games.
- Surveys of teachers and parents were administered at the beginning and end of the study to assess attitudes, practices, and children's physical activity at home.

Data analysis

- Quantitative data were analyzed in SPSS 26.0. Normality was tested using the Kolmogorov-Smirnov test. Intergroup differences were assessed by one-way ANOVA with Tukey's post hoc test, and categorical data were analyzed using Pearson's χ^2 test. The significance level was set at $p < 0.05$.
- Mean values and standard deviations were calculated for anthropometric indicators, and changes were assessed by comparing baseline and final measurements.
- Qualitative data from interviews and focus groups were analyzed in NVivo 12 using thematic analysis and inductive coding. Data triangulation, independent coding by two researchers, and Cohen's kappa were used to improve reliability.
- Pedagogical diaries and observation protocols were examined through content analysis.

Results and Discussion

Results on preschoolers' physical development

The results on anthropometric changes among younger (3–4 years) and older (5–6 years) preschoolers are presented in **Table 3**.

Table 3. Dynamics of the anthropometric indicators of preschool children in control and experimental groups (M±SD)

Indicator	Control group (n=50)		Experimental group 1 (n=50)		Experimental group 2 (n=50)		F-test	p-value
	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment		
Younger preschool age (3–4 years)								
Height (cm)	98.3±5.2	103.8±5.4	98.5±5.1	104.3±5.3	98.2±5.3	104.1±5.4	0.82	0.442
Weight (kg)	15.2±2.1	17.3±2.2	15.3±2.0	17.5±2.1	15.1±2.2	17.4±2.3	0.76	0.468
BMI (kg/m²)	15.7±1.3	16.0±1.4	15.8±1.2	16.1±1.3	15.6±1.4	16.0±1.4	0.64	0.528
Chest circumference (cm)	52.1±2.6	54.2±2.7	52.2±2.5	54.5±2.6	52.0±2.7	54.4±2.8	1.02	0.362
Older preschool age (5–6 years)								
Height (cm)	110.3±5.9	115.8±6.1	110.5±5.8	116.3±6.0	110.2±6.0	116.1±6.2	0.91	0.404
Weight (kg)	19.2±2.5	21.3±2.6	19.3±2.4	21.5±2.5	19.1±2.6	21.4±2.7	0.88	0.416
BMI (kg/m²)	15.8±1.5	15.9±1.6	15.9±1.4	16.0±1.5	15.7±1.6	15.9±1.6	0.59	0.555
Chest circumference (cm)	55.3±2.9	57.4±3.0	55.4±2.8	57.9±2.9	55.2±3.0	57.8±3.1	1.38	0.253
Dynamometry (kg)	8.3±1.4	9.2±1.5	8.4±1.3	9.5±1.4	8.2±1.5	9.4±1.6	1.41	0.246

Note: F-test and p-value are presented for one-factor ANOVA among the three groups for post-experiment results.

These data show that there are no statistically significant differences between the control and experimental groups in any anthropometric indicators both in younger ($p>0.05$) and older ($p>0.05$) preschool ages. The obtained results demonstrate that

the use of Kazakh national sports games in different methodological formats (structured classes and the combined approach) does not have a differentiated effect on basic anthropometric parameters compared to the standard physical education program.

Results on motor development (M-ABC-2)

The results obtained through M-ABC-2 are analyzed in **Table 4**.

Table 4. M-ABC-2 results of preschool children in control and experimental groups before and after the experiment (M±SD)

M-ABC-2 component	Control group (n=50)		Experimental group 1 (n=50)		Experimental group 2 (n=50)		F-test	p-value
	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment		
Younger preschool age (3–4 years)								
Manual Dexterity	7.8±2.0	8.9±2.1	7.7±2.1	9.3±2.0	7.8±1.9	9.4±1.8	1.94	0.146
Aiming and Catching	7.5±2.2	8.3±2.3	7.6±2.1	8.7±2.2	7.4±2.0	8.9±2.1	2.47	0.087
Balance	8.1±1.9	9.2±2.0	8.0±2.0	9.6±1.9	8.2±1.8	9.7±1.7	2.34	0.099
Total Standard Score	7.8±1.7	8.8±1.8	7.7±1.8	9.2±1.7	7.9±1.6	9.3±1.5	2.38	0.095
Older preschool age (5–6 years)								
Manual Dexterity	8.6±2.2	9.7±2.3	8.5±2.3	10.1±2.2	8.6±2.1	10.2±2.0	1.89	0.153
Aiming and Catching	8.3±2.4	9.1±2.5	8.2±2.5	9.5±2.4	8.3±2.4	9.7±2.3	2.53	0.082
Balance	8.9±2.1	10.0±2.2	8.8±2.2	10.4±2.1	8.8±2.0	10.6±1.9	2.41	0.094
Total Standard Score	8.6±1.9	9.6±2.0	8.5±2.0	10.0±1.9	8.6±1.8	10.2±1.7	2.52	0.083

Note: F-test and p-value are presented for one-factor ANOVA among the three groups for post-experiment results.

The conducted data analysis shows no statistically significant differences between the control and experimental groups in any of the components of motor development in both younger and older preschoolers ($p>0.05$). However, we should note that Experimental group 2 (combined approach) shows a tendency to more pronounced improvement, especially in "Aiming and Catching" and "Balance".

The comparative analysis of age groups demonstrates a stronger positive dynamic of motor development in 3–4-year-old children compared to the age of 5–6 years. This may suggest that younger preschoolers are more responsive to pedagogical influence through national sports games. Pedagogical observations indicate that in the experimental groups, preschoolers of both age groups show higher motivation when performing motor tasks as part of Kazakh national sports games.

Results on cognitive and socio-emotional development (GNOM)

Table 5 shows a differential analysis of the results of the "GNOM" test.

Table 5. "GNOM" test results of preschool children in control and experimental groups before and after the experiment (M±SD)

Blocks in the "GNOM" test	Control group (n=50)		Experimental group 1 (n=50)		Experimental group 2 (n=50)		F-test	p-value
	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment		
Younger preschool age (3–4 years)								
Movements and actions (%)	68.4±8.0	74.2±8.2	68.6±7.9	76.3±7.8	68.3±8.1	76.8±7.7	2.82	0.062
Perception (%)	70.8±7.6	76.3±7.8	71.0±7.5	77.5±7.4	70.7±7.7	77.8±7.3	1.24	0.291
Speech functions (%)	69.5±8.3	75.4±8.5	69.7±8.2	76.6±8.0	69.4±8.4	76.9±7.9	1.07	0.345
Attention and memory (%)	67.2±8.8	72.8±9.0	67.0±8.7	74.2±8.5	67.3±8.9	74.8±8.4	1.54	0.217
Thinking (%)	65.7±8.5	71.5±8.7	65.5±8.4	73.2±8.3	65.8±8.6	74.0±8.2	2.48	0.087
Success Index (%)	68.3±7.0	74.0±7.2	68.4±6.9	75.6±6.8	68.3±7.1	76.1±6.7	2.75	0.066
Older preschool age (5–6 years)								
Movements and actions (%)	76.4±8.6	82.2±8.8	76.6±8.5	84.3±8.4	76.3±8.7	84.8±8.3	2.71	0.068
Perception (%)	78.8±8.2	84.3±8.4	79.0±8.1	85.5±8.0	78.7±8.3	85.8±7.9	1.15	0.318
Speech functions (%)	77.5±8.9	83.4±9.1	77.7±8.8	84.6±8.6	77.4±9.0	84.9±8.5	0.98	0.377
Attention and memory (%)	75.2±9.4	80.8±9.6	75.0±9.3	82.2±9.1	75.3±9.5	82.8±9.0	1.35	0.261
Thinking (%)	73.7±9.1	79.5±9.3	73.5±9.0	81.2±8.9	73.8±9.2	82.0±8.8	2.27	0.105
Success Index (%)	76.3±7.6	82.0±7.8	76.4±7.5	83.6±7.4	76.3±7.7	84.1±7.3	2.41	0.092

Note: F-test and p-value are presented for one-factor ANOVA among the three groups for post-experiment results.

No statistically significant differences were found between the control and experimental groups in either age category ($p > 0.05$). However, the indicators for movements and actions, thinking, and the total success index approached significance ($p < 0.1$) in both groups. The most pronounced positive trend was observed in Experimental group 2 (combined approach), in line with the M-ABC-2 results. This effect was more evident in children aged 3–4 years, whereas in the 5–6-year group it was weaker but still noticeable. Overall, the combined approach appeared to support cognitive and socio-emotional development, especially in younger preschoolers, although the differences did not reach conventional statistical significance.

Parent survey results

The results of the survey of parents are summarized in **Table 6**.

Table 6. Dynamics of parents' attitudes towards Kazakh national sports games (n=100)

Indicator	Control group (n=50)		Experimental group 1 (n=25)		Experimental group 2 (n=25)		χ^2*	p-value*
	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment	Pre-experiment	Post-experiment		
Familiarity with Kazakh national sports games								
Well familiar	12.0%	14.0%	10.0%	30.0%	10.0%	34.0%		
Partially familiar	30.0%	36.0%	30.0%	42.0%	28.0%	46.0%		
Heard of them, but do not know the rules	40.0%	36.0%	42.0%	24.0%	42.0%	18.0%	13.26	<0.01
Unfamiliar	18.0%	14.0%	18.0%	4.0%	20.0%	2.0%		
Child playing Kazakh national games at home								
Regularly	4.0%	6.0%	2.0%	26.0%	2.0%	34.0%		
Sometimes	14.0%	20.0%	14.0%	38.0%	14.0%	42.0%	15.87	<0.01
Rarely	26.0%	22.0%	24.0%	28.0%	26.0%	20.0%		
Never	56.0%	52.0%	60.0%	8.0%	58.0%	4.0%		
Attitudes to the importance of introducing children to Kazakh national sports games								
Very important	18.0%	20.0%	16.0%	38.0%	14.0%	42.0%		
Important	32.0%	36.0%	32.0%	42.0%	34.0%	46.0%	10.94	<0.01
Not very important	36.0%	32.0%	38.0%	16.0%	38.0%	10.0%		
Unimportant	14.0%	12.0%	14.0%	4.0%	14.0%	2.0%		

*Note: χ^2 and p-value are presented to compare the distributions between the three groups after the experiment.

Statistically significant differences were found between the control and experimental groups after the intervention ($p < 0.01$). Compared with the control group, parents in the experimental groups showed a more positive attitude toward Kazakh national sports games. Experimental group 2 (combined approach) demonstrated the greatest improvement across all indicators, including a 32% increase in children regularly playing national games at home and a marked rise in the proportion of parents considering such familiarization very important (from 14.0% to 42.0%). These findings suggest that the educational effects of the program extended to the family environment and contributed to stronger support for national cultural traditions.

Results of qualitative analysis

Thematic analysis allowed us to identify key thematic clusters characterizing the perception of the integration process by different categories of stakeholders **(Table 7)**.

Table 7. Key thematic clusters in qualitative analysis

Thematic cluster	Frequency of mentions	Representative statement
Children's emotional engagement	94%	"Children look forward to activities related to national games, they don't need to be motivated, asking to play assyk atu or togyz kumalak themselves" (teacher, 29 years old)
Cultural and educational value	87%	"Kazakh national sports games create a natural mechanism for integrating physical development and building the child's cultural identity" (expert, 54 years old)
Transmission of cultural traditions	83%	"When a child participates in traditional games, they not only engage in physical activity, but also learn cultural experiences that are transmitted through generations" (teacher, 42 years old)
Adaptability of national games	76%	"After appropriate modification of the equipment and optimization of the rules, even 3-year-old children successfully master the elements of the assyk atu game" (teacher, 35 years old)
Boosting family involvement	79%	"Children initiate discussions of Kazakh games in the home environment, which sperks cognitive interest among parents, and some even go to the preschool to learn about the methodology of organizing play activities" (preschool administrator, 48 years old)
Intergenerational communication	73%	"The integration of national games has helped to increase the participation of the older generation in the preschool educational process and to create conditions for transmitting traditional knowledge" (preschool administrator, 51 years old)

Formation of cultural identity	68%	"Children develop a cognitive-emotional connection to national culture, especially in terms of recognizing the uniqueness of traditional play practices" (teacher, 38 years old)

The identified thematic clusters reflect a multifaceted perception of national sports games within the educational process. Children's emotional engagement emerged as the dominant theme and was consistent with the quantitative results, particularly in the combined-approach group. Frequent references to cultural, educational, and social aspects indicate that the effects of national sports games extend beyond the preschool setting and influence the broader educational environment. Overall, the qualitative findings support the quantitative results and confirm the broader pedagogical value of integrating Kazakh national sports games.

The primary research question in this paper was aimed at identifying effective approaches to the integration of Kazakh national sports games into the system of physical education for preschool children. The combined approach in experimental group 2 shows a tendency towards more pronounced positive dynamics in preschoolers' psychomotor development, although statistically significant differences between the groups have not been achieved. The analysis of variations in pedagogical influence suggests that the optimal ratio of structured to unstructured activities is 50:50. This ratio ensures the most comprehensive development of preschoolers while keeping them motivated and engaged in the educational process. This conclusion is consistent with research by Rombot (2017) [22, 31, 32], which demonstrates the effectiveness of combined approaches to preschool physical education using traditional games.

Analyzing the first additional research question about the most applicable elements of national sports for different age groups, we found a clear differentiation. For children aged 3–4 years, the most effective were the adapted versions of assyk atu and arkan tartys, which can be explained by their relevance to the psycho-physiological characteristics of younger preschoolers. For children aged 5–6 years, the optimal options were the adapted versions of togyz kumalak and tenge alu, which require more developed cognitive functions and coordination abilities.

The discovered age differences in susceptibility to the effects of national sports games, with a more pronounced effect in the 3–4-year-olds group, correlate with the concept of sensitive periods in childhood development. This observation has significant practical implications for the differentiation of pedagogical approaches in different age groups in preschool institutions and aligns with research demonstrating that motor skills develop most intensively in the younger preschool age.

In addressing the second additional research question about the competencies needed by teachers, several key areas were identified. Cultural and historical competencies involve a deep understanding of the origin and cultural context of Kazakh national sports [33-35]. Only 14% of the surveyed educators rated their level of competence as "high", indicating the need for additional training. Methodological competencies cover the ability to adapt game equipment and rules considering children's age characteristics. As many as 78% of teachers needed professional development in the methodology of adapting national games. Integration competencies, such as the ability to incorporate elements of national games into the existing program, is the most challenging aspect according to the results of focus groups. Finally, reflexive-analytical competencies, which imply the ability to analyze the effectiveness of methods, are lacking in 63% of teachers.

These findings are consistent with research by Karatas and Halmatov (2023) [26, 36, 37], which emphasizes teachers' insufficient methodological competence. Based on the obtained data, we propose a modular system of advanced training with theoretical, practical, and methodological modules, which provide a systemic approach to the development of all necessary competencies.

The third additional research question pertains to comparing the effects of national sports games and the standard physical education program. While no statistically significant differences were found in physical and cognitive development, significant differences were observed in other aspects. Children's emotional engagement was identified as the dominant thematic cluster in the qualitative analysis (94%). Teachers emphasize children's high intrinsic motivation to participate in national games, which contrasts with the typical program, where motivational problems are more common.

A particularly important aspect is the development of cultural identity. The parent survey revealed a dramatic change in their perception of the importance of familiarizing children with national games. This is consistent with the argument of Kalshabayeva and Imanberlinova (2018) [20, 38, 39] that traditional games play a prominent role in the development of cultural identity. A unique effect is the activation of intergenerational communication and the transfer of traditional knowledge, which is not achieved by the standard program.

The most telling result is the transposition of educational effects into the family environment. The significant increase in the frequency of playing national games at home in the experimental groups shows that the educational impact extends beyond preschool institutions and creates a more holistic developmental environment. This effect gives grounds to suggest a systemic influence of the developed methodology on the child's sociocultural environment.

Our results agree with the conclusions of Jarwo *et al.* (2021) [23, 40, 41] about a dual effect of traditional games, i.e., the development of motor skills and the preservation of national culture. An interesting aspect is the more pronounced positive dynamics in the parameters of "Aiming and Catching" and "Balance" in the M-ABC-2 test in experimental group 2. This result may reflect the specific impact of Kazakh national sports games on certain components of motor development. This assumption, however, requires further verification in studies with more prolonged experimental impact.

Integrating our findings, we can formulate a comprehensive theoretical model of the impact of national sports games on the development of preschool children. In this model, the physical, cognitive, and socio-emotional facets of development are regarded not as separate domains, but as intertwined components of a single process catalyzed by culturally conditioned motor activity. This concept is consistent with modern ideas about a holistic approach to early childhood education and opens new avenues for integrating the cultural component into the physical education system [42, 43].

The pedagogical significance of our research consists in the substantiation of specific methodological recommendations on integrating Kazakh national sports games into preschool physical education. The 50:50 ratio of structured to unstructured activities, the order in which different types of games should be introduced considering age specifics, and the features of adapting game equipment and rules are the aspects that can be directly applied in the practice of preschool educational institutions [44, 45].

The social significance of our study lies in its contribution to the preservation of the cultural heritage of the Kazakh people through the integration of traditional sports games into the education system. Survey results indicate that parents have developed a more conscious attitude towards cultural traditions in their families, which constitutes a major factor in strengthening national identity.

Conclusion

The study examined approaches to integrating Kazakh national sports games into preschool physical education. Although statistically significant improvements in physical, cognitive, and socio-emotional development were not confirmed ($p > 0.05$), the experimental groups, especially the combined-approach group, showed more favorable trends. The study was limited by the 10-month intervention period, the restricted range of games, and the absence of longitudinal follow-up. Future research should examine neurocognitive mechanisms, the specific effects of different games, and long-term outcomes. Despite these limitations, the study contributes a culturally grounded methodological model and supports the use of a combined structured and unstructured approach in Kazakh preschool education settings.

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